

ROSS ENVIRONMENTAL ASSOCIATES, INC.

Hydrogeology, Water Quality, GIS Planning,
Contaminant Fate & Transport, Remediation,
& Regulatory Compliance and Permitting



**Initial Site Investigation &
Emergency Corrective Action Report**

**Grace United Methodist Church
36 Central Street
St. Johnsbury, Vermont 05819**

**Site Coordinates:
44° 25'10.43" N, 72° 01' 19.49" W**

SMS Site #: 2006-3478

20 March 2006

Prepared For:

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R.E.A. Project No. 26-012
R.E.A. Document #: 26012ISI

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EXECUTIVE SUMMARY

Ross Environmental Associates, Inc. (***R.E.A.***) has conducted an initial site investigation (ISI) and emergency corrective action at the Grace United Methodist Church, located on Central Street in St. Johnsbury, Vermont, where petroleum contamination was discovered after a 1,000-gallon fuel-oil underground storage tank (UST) was found to have catastrophically released approximately 900 to 1,400 gallons of fuel-oil between 20 and 21 January 2006. During the UST closure on 24 January 2006, petroleum contamination was detected above Vermont State guidelines in soils within the excavation. Field investigation for the initial site investigation included: installation of five soil borings and four monitoring wells, field screening of subsurface soil samples for the possible presence of volatile organic compounds (VOCs), sampling and analysis of water from four on-site monitoring wells, and a receptor survey to identify potential risks to the environment and human health.

In addition to the initial site investigation, at the request of the Vermont Department of Environmental Conservation (VT DEC), a soil vapor extraction system (SVE) was installed to prevent downward migration of the product toward the water table, and to recover petroleum vapors adjacent to the church basement. Installation of the soil vapor extraction system included: installation of one lateral SVE point within the former UST excavation (SVE-2), and three vertical SVE points (SVE-1, SVE-3, and SVE-4) screened through the vadose zone within and downgradient of the release area. These four SVE points were plumbed to an above-ground liquid-vapor separating drum, a 1.5 horsepower regenerative blower, and two granular activated carbon treatment drums.

Four monitoring wells (MW-1, MW-2, MW-3, and MW-4) were installed on the property to evaluate the degree of subsurface contamination within the underground storage tank (UST) excavation and downgradient from the former UST. No volatile petroleum compounds were detected in any of the monitoring wells. Total petroleum hydrocarbons were detected in the sample collected from MW-1 (located within the former UST excavation) at 0.55 micrograms per liter (mg/L). Total petroleum hydrocarbons were not detected in water samples from any of the other monitoring wells. Available information indicates that at this time, groundwater beneath the site has been minimally impacted by total petroleum hydrocarbons.

EXECUTIVE SUMMARY

On the basis of the results of this investigation, **R.E.A.** makes the following recommendations.

1. The monitoring wells should be sampled to confirm the original results. Each monitoring well should be sampled for the possible presence of volatile petroleum compounds and total petroleum hydrocarbons in accordance with U.S. EPA Methods 8021b and 8015DRO (diesel-range organics), respectively. This sampling event should occur during May 2006.
2. Operation of the SVE system should be continued until influent PID readings are less than 10 ppmv.
3. The influent and effluent air flow of the SVE system should be monitored using a portable photoionization detector (PID) on a bi-weekly basis. The indoor air of the basement and elevator shaft of the church should also be screened with the PID during each inspection. Additionally, monitoring well MW-1 should be monitored for the possible presence of free product during these routine system inspections. A mass removal calculation table should be created for the Site, which would use influent PID concentrations, influent oxygen concentrations, and background oxygen concentrations to calculate the estimated total contaminant mass removed by the SVE system.
4. An influent air sample (pre treatment) should be collected from the SVE system, and analyzed for volatile petroleum compounds by EPA method 8021B to determine baseline concentrations of individual organic compounds in the extraction stream.
5. A summary report should be completed following the next groundwater sampling event, which should include recommendations for long-term monitoring.
6. The area of the UST excavation and trenching should be re-graded and paved as soon as weather permits.

SITE PROFILE

Site Information

Site Name: Grace United Methodist Church
SMS Site #: 2006-3478
Site Address: 36 Central Street, St. Johnsbury, VT
Mailing Address: 36 Central Street, St. Johnsbury, VT
Telephone: (802) 748-2895
Contact/Owner: Mr. James Impey, Trustee
Coordinates: latitude 44° 25' 10.43" N, and longitude 72° 01' 19.49" W.
Contaminants of Concern: Petroleum, characteristic of fuel-oil

Source: One leaking underground storage tank, removed in January 2006.

Aquifer Characteristics

Soil Type: The soils at the site consisted primarily of fine sand, with some silt.
Effective Porosity: 0.3
Hydraulic conductivity: 0.5 to 57 ft/day
Ground-water flow direction: southeast
Horizontal hydraulic gradient: <1 % (2/13/06)
Average ground water velocity: 0.0167 to 1.9 ft/day
Ground-water depth bgs: 24 to 25 feet bgs
Saturated thickness: 5 to 6 feet
Depth to Bedrock: >30 feet bgs

Receptors

Drinking water: The Grace United Methodist Church and the surrounding properties are served by the Town of St. Johnsbury Water System (WSID #5045).
Ground water: No volatile petroleum compounds were detected in any of the onsite monitoring wells. Total petroleum hydrocarbons were detected in monitoring well MW-1 at 0.55 mg/L; however, total petroleum hydrocarbons were not detected in any other monitoring wells; see Table 2, Appendix A.
Surface water: The Passumpsic River is located approximately 2,200 feet east of the former UST, and the Sleepers River is located approximately 2,300 feet west of the former UST.
Buildings: The church, which is constructed on a full stone basement, is located approximately five feet south of the former UST system. PID readings in the basement on the day of the UST closure were 0.0 ppmv.
Underground utilities: The Town of St. Johnsbury water line comes into the building from Main Street on the eastern side of the church, and the Town of St. Johnsbury sewer line exits the building on the western side and continues down Central Street.

1.0 INTRODUCTION

Immediately following the closure of one 1,000-gallon fuel-oil UST, Mr. James Impey, Trustee of the Grace United Methodist Church, retained the services of **R.E.A.** to complete an initial site investigation (ISI) through the “Expressway Process” at the Site in accordance with Vermont Department of Environmental Conservation (VT DEC) guidelines. This report has been prepared by **R.E.A.** under the direction of Mr. Impey; unauthorized use or reproduction of this report is prohibited, without written authorization from **R.E.A.**, Mr. Impey, or the Grace United Methodist Church.

1.1 Site Location and Setting

The subject property, which is owned by the Grace United Methodist Church, is occupied by a church and a dwelling located at 36 Central Street in St. Johnsbury, Vermont (**Figure 1 & 2**, Appendix A). Drinking water for the property and surrounding properties is provided by the Town of St. Johnsbury Water System (WSID # 5045). Wastewater disposal for the property and surrounding properties is also provided by the Town of St. Johnsbury. The 1,000-gallon fuel-oil UST was located approximately five feet north of the northern side of the church. Photographs of the site and surrounding area taken during the initial site investigation are included in Appendix B.

The ground surface is relatively flat, with an average elevation of 688 feet above mean sea level (Maptech, 1998). The Passumpsic River is located approximately 2,200 feet east of the site, and the Sleepers River is located approximately 2,300 feet west of the site. The geographic coordinates of the site are: latitude 44° 25' 10.43" N and longitude 72° 01' 19.49" W.

The surficial geology in the vicinity of the site is mapped as well sorted littoral sediment, predominantly sand with no pebbles or boulders (Stewart and MacClintock, 1970). Bedrock in the area is mapped as the Waits River formation, which consists of gray quartzose and micaceous crystalline limestone, weathered to a distinctive brown earthy crust, interbedded and intergradational with gray quartz-muscovite phyllite or schist (Doll, 1961). No bedrock outcrops were observed on the site or adjacent properties.

1.2 Site History

On 20 January 2006, Fred's Plumbing and Heating of St. Johnsbury, Vermont delivered 931 gallons of fuel oil to the 1,000 gallon underground storage tank located at the Grace Methodist Church. On 21 January 2006, approximately 300 gallons of fuel-oil remained in the UST, and the UST was found to be empty around noon. On 22 January 2006, Mr. Marc Roy of the Vermont Department of

Environmental Conservation (VT DEC) was notified of a possible fuel-oil released based upon the observations of fuel within the UST.

On 24 January 2006, **R.E.A** provided oversight for the closure of the 1,000-gallon fuel-oil UST located at the Grace Methodist Church in St. Johnsbury, Vermont. The UST was a 1,000-gallon single-walled steel tank, believed to be between 25 to 40 years old. Approximately 35 gallons of waste fuel oil and tank bottom sludge were removed from the tank and placed in a 55-gallon drum for disposal by Environmental Products and Services of Burlington, VT. The UST was found to be in poor condition, with minor rust and deep pitting. Two holes were observed in the bottom of the eastern end of the UST ranging in size from approximately one to five centimeters.

Soils in the excavation consisted of coarse to medium light brown sands from ground surface to approximately 10 feet below ground surface (bgs). Fine to very fine silty sands were encountered between approximately 10.5 to 11 feet, and coarse to medium light brown sands were observed to an approximate depth of 13.0 feet bgs. Very strong petroleum odors were noted on soils directly beneath the UST, which were at a depth of approximately 8 feet bgs. PID readings on soils from the excavation ranged from 1.7 to 455 parts per million per volume (ppmv), which are above the VT DEC action level of 10 ppmv for fuel oil/diesel contaminated soils. The highest PID readings were obtained from soils located at approximately 13 feet bgs. Ground water was not encountered within the UST excavation, which extended to a depth of approximately 13 bgs. Based on the findings of the UST closure, the subsurface petroleum contamination is most likely due to the holes found in the bottom of the tank.

1.3 Land Use and Adjacent Property Ownership

The subject property is located within a residential/light commercial neighborhood in St. Johnsbury, Vermont. The adjacent properties to the north are residential, to the east are commercial with residential apartments, and Central Street forms the southern boundary. Goss Tire, a State of Vermont Hazardous Waste Site (SMS Site #96-2030), borders the property to the west of the church. Figure 2, an aerial photograph taken in 2003, shows adjacent property ownership and general site setting (Appendix A).

2.0 Field Investigation Results and Procedures

R.E.A.'s field investigation included: the installation of five soil borings and four monitoring wells (MW-1, MW-2, MW-3, MW-4, and SB-5); field screening of subsurface soil samples for the possible presence of volatile organic compounds (VOCs) using a portable photo-ionization detector (PID); collection and analysis of water samples from four on-site monitoring wells, and a receptor survey to identify potential risks to the environment and human health. Approximate monitoring well locations and significant site features are shown on **Figure 3** in Appendix A.

The objectives of this initial site investigation were to:

- Evaluate the degree and extent of petroleum contamination in soils and ground water;
- Qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways.
- Identify the need for further site characterization, appropriate monitoring, and/or remedial actions based on the site conditions.

2.1 Contaminants of Concern

Based on available information, the contaminant of concern (COC) at the Grace United Methodist Church property appears to be fuel-oil.

2.2 Source Area Evaluation

Based on available information, the source of petroleum contamination discovered at the Grace United Methodist Church property is the former UST system, which was used to store fuel-oil for heating purposes. The UST was removed in January 2006, and was found to be in poor condition, with minor rust and deep pitting, and two holes in the bottom of the tank. It is estimated that approximately 900 to 1,400 gallons of fuel-oil were catastrophically released from the UST; however, available information indicates that groundwater beneath the site, which is approximately 24 feet bgs, has not been significantly impacted by volatile petroleum compounds at this time.

2.3 Soil Boring and Monitoring Well Installation

On 31 January 2006, **R.E.A.** provided oversight during the installation of a four-inch monitoring well within the former UST excavation. On 2 February 2006, monitoring wells MW-2 and MW-3 were installed in the presumed downgradient direction, and MW-4 was installed in the presumed upgradient direction from the former UST system. On 8 February 2006 SB-5 was completed between MW-1 and MW-4 to better understand the potential locations for the SVE wells. The soils at the site consisted primarily of fine to medium sand with some silt lenses. The soil borings for the monitoring

wells were extended to at least five feet below the water table, which was encountered approximately 24 to 25 feet bgs at the time of drilling.

Monitoring well MW-1 was constructed using 4.0-inch-diameter schedule 40 polyvinyl chloride (PVC), and MW-2, MW-3, and MW-4 were constructed using 1.0-inch-diameter schedule 40 PVC. The PVC has flush threaded joints, with a ten-foot section of 0.01-inch factory-slotted well screen installed at the bottom. Solid PVC risers, extending to ground surface, were used to complete each well. A clean sand pack was placed around the screened section of each monitoring well extending one to two feet above the top of the screen, with a bentonite seal placed above the sand pack. Flush-mounted road-box protective casings were installed over each monitoring well. Each well was developed after installation by removing eight to ten standing volumes of water using a peristaltic pump. Soil descriptions and monitoring well construction details are included on the soil boring logs in Appendix C. Expedition Drilling, Inc. of Hampstead, NH installed the soil borings and monitoring wells under direct supervision of **R.E.A.**'s geologist.

Photo-ionization detector (PID) readings on soil samples collected from monitoring well MW-1 ranged between 0.0 and 387 ppmv, which are above the VT DEC action limit of 10 ppmv for fuel-oil/diesel contaminated soils. The highest PID readings from MW-1 were detected on soils above the water table between 6 and 9 feet bgs, which corresponds to the bottom of the former UST. Below 9 feet, PID readings in the MW-1 soil boring generally decreased with depth. PID readings on soil borings for MW-2, MW-3, MW-4, and SB-5 generally ranged from 0.0 to 3.9 ppmv, which are below the VT DEC action limit, with the exception of one PID reading of 13.4 ppmv detected at four feet bgs in the MW-4 soil boring. PID screening results are included on the soil boring logs in Appendix C. **R.E.A.**'s geologist screened soil samples from the soil borings for the possible presence of volatile organic compounds (VOCs) using a Photovac PE2020 portable PID. The PID was calibrated with an isobutylene standard gas to a benzene reference on each day of drilling.

After installation of the soil boring/monitoring wells, **R.E.A.** surveyed the locations of the boring/wells in relation to existing site features and roadways. Each boring/well was located in azimuth to an accuracy of ± 1.0 feet, and in elevation with an accuracy of ± 0.01 feet relative to an on-site benchmark of 100.00 feet (MW-1).

2.4 Ground Water Elevations and Flow Direction

On 13 February 2006, ground-water flow in the unconfined surficial aquifer at the site was toward the southeast with an estimated hydraulic gradient of less than one percent. Water-level measurements and elevation calculations for 13 February 2006, are presented in **Table 1** and the ground-water contour map prepared using this data is presented as **Figure 4**, Appendix A.

Static water-table elevations were computed for each monitoring well by subtracting measured depth-to-water readings from the surveyed top-of-casing (TOC) elevations, which are relative to an arbitrary site datum of 100.00 feet (MW-1).

The effective porosity of the predominantly fine sand encountered below the water-table is presumably around 0.3, with hydraulic conductivities of 0.5 to 57 feet per day (Freeze & Cherry, 1979). Assuming Darcian flow, these estimates combine with the calculated horizontal gradient of approximately one percent to yield an estimated range of ground-water flow velocities of between 0.0167 to 1.9 feet per day. Contaminant migration would be less accounting for retardation and dispersion of the contaminants.

2.5 Ground Water Sampling and Analysis

Based on available information, groundwater has not been significantly impacted by the fuel-oil contamination at this time. No volatile petroleum compounds were detected in any of the monitoring wells. Total petroleum hydrocarbons were detected at 0.55 milligrams per liter (mg/L) in the sample collected from MW-1, which is located within the former tank excavation. No total petroleum hydrocarbons were detected in the samples collected from any of the other monitoring wells. Contaminant distribution, based on samples collected on 13 February 2006, is shown on **Figure 5** in Appendix A.

No petroleum compounds were detected in the trip-blank sample, and the duplicate sample results (MW-1) were within approximately 22 percent of the original. The analytical results are summarized on **Table 2**, and copies of the laboratory analytical reports are included as Appendix D.

Prior to sample collection, **R.E.A** field personnel measured the water level in each monitoring well and purged approximately three to five standing volumes of water from each well. All monitoring well samples were collected by pumping water from the well using a peristaltic pump directly into 40-milliliter glass vials with Teflon®-lined septum lids. Immediately after sample collection, field measurements were obtained for pH, specific conductivity, temperature, total dissolved solids (TDS),

and oxygen reduction potential (ORP). A summary of the field measurement data is included on **Table 3**, in Appendix A.

On 13 February 2006, ground water samples were collected from four monitoring wells (MW-1, MW-2, MW-3, and MW-4). Ground water samples from monitoring wells were analyzed for the possible presence of volatile petroleum compounds and total petroleum hydrocarbons (TPH) in accordance with U.S. EPA Methods 8021B and 8015-diesel range organics (DRO), respectively. All samples were transported under chain-of-custody in an ice-filled cooler to Endyne, Inc. of Williston, Vermont for laboratory analysis.

2.6 Conceptual Model

Based on fuel-oil delivery records and field investigations, it is estimated that approximately 900 to 1,400 gallons of fuel-oil were catastrophically released into the subsurface from a 1,000-gallon underground storage tank located at the Grace United Methodist Church. At this time, it appears that the majority of the contamination is captured in the unsaturated zone immediately beneath the former UST. While free product has not yet been detected in ground water, which is located approximately 24 feet bgs, laboratory analytical data indicates that groundwater has been impacted by low concentrations of petroleum contamination. Available information indicates that the rapid corrective action response has effectively reduced downward migration of free product; however, based on the volume of fuel released, there is still a significant potential that free product could reach ground water. Additionally, based on the direction of groundwater flow, free product could migrate beneath the church basement.

2.7 Investigation Procedures

The procedures used during the initial site investigation at the Grace United Methodist Church are consistent with the following guidance documents:

- *“Underground Storage Tank Closure and Site Assessment Requirements.”* Vermont Agency of Natural Resources, Waste Management Division. June 2003.
- *“Site Investigation Guidance.”* Vermont Agency of Natural Resources, Waste Management Division. June 2005.
- *“Corrective Action Guidance.”* Vermont Agency of Natural Resources, Waste Management Division. November 1997.
- *“Agency Guidelines for Petroleum Contaminated Soil and Debris.”* Vermont Agency of Natural Resources, Waste Management Division. August 1996.

- “Interim Site Cleanup Standards” Vermont Agency of Natural Resources, Waste Management Division. 29 November 2004.
- ASTM D 2488-93. “*Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*.” American Society for Testing and Materials.
- ASTM D 5092-90. “*Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers*.” American Society for Testing and Materials.
- ASTM D 4750-87. “*Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well*.” American Society for Testing and Materials.
- ASTM D 4448-85a. “*Standard Guide for Sampling Ground Water Monitoring Wells*.” American Society for Testing and Materials.

3.0 EMERGENCY CORRECTIVE ACTION

3.1 Soil Vapor Extraction System

On 24 January 2006 during the UST closure, at the request of the VT DEC, a horizontal soil vapor extraction (SVE) point was installed at the bottom of the former UST excavation. Approximately two feet of crushed stone were placed in the bottom of the former UST excavation and a ten foot section of 2-inch diameter PVC well screen wrapped with filter fabric was laid on top of the stone. A 2-inch diameter PVC riser pipe was extended to ground surface. Approximately two feet of crushed stone was used to cover the horizontal portion of the system prior to backfilling the excavation.

On 25 January 2006, a 1.5 horsepower regenerative blower was connected to the horizontal soil vapor extraction point. Emissions from the vapor extraction system were treated through one 55-gallon drum of granulated activated carbon (GAC).

3.2 Additional Soil Vapor Extraction Wells

On 8 February 2006, **R.E.A.** supervised the installation of three additional SVE wells. Approximate locations of the SVE wells are shown on **Figure 3** in Appendix A. SVE wells were constructed using two-inch diameter PVC material to depths of approximately 22 feet below ground surface (bgs). The screened sections of the SVE wells were 15 feet in length, with a slot size of 0.02 inch. Solid casing was extended from the top of the screened sections to within about 0.5 feet bgs. A sand pack (#1 sand) was placed around each well screen, and extended to approximately one-foot above the well screen. The annular space above the sand pack was backfilled with hydrated bentonite chips.

Each SVE well was protected at the surface with a flush mounted manhole cover with sufficient room to allow for access during routine operation and maintenance. Photographs documenting site activities are included in Appendix B. Well construction logs are provided in Appendix C.

3.3 Trenching and Site Restoration

Trenching and subsurface piping was implemented between 9 and 10 February 2006. The SVE wells were connected by individual pipes installed within subsurface trenches to a manifold located within an equipment enclosure. Subsurface conveyance piping for the SVE system was constructed of two-inch diameter, schedule 80 PVC. Subsurface piping was placed approximately three to four feet bgs, and bedded with appropriate fill material. Insulation board was installed on top of the bedding material to reduce frost penetration. Suitable materials were used to backfill on top of the insulation board to the pre-existing grade, which was compacted in at least 12-inch lifts. Due to freezing conditions, the trenching and former UST area were not repaved; however, this task should be completed as soon as weather permits.

3.4 Vapor Treatment System

The petroleum vapors recovered through the soil vapor extraction system are treated through two in-line granular activated carbon (GAC) drums. Influent and effluent photoionization detector (PID) readings are collected on a regular basis to determine the volatile organic compound (VOC) destruction efficiency. Influent readings between 25 January and 6 March 2006 have ranged from 10.3 to 190 ppmv. A table summarizing VOC treatment efficiency and a chart summarizing influent PID readings are included in Appendix E.

3.5 SVE System Components

The SVE system is comprised of four subsurface vapor extraction points, which connect into a manifold that empties into a vapor-liquid separating drum. The drum is connected to a 1.5 horsepower regenerative blower, and two in-line 200-pound vapor phase GAC drums for vapor treatment. The system is housed in an 8 by 3 foot shed.

4.0 SENSITIVE RECEPTOR IDENTIFICATION AND RISK ASSESSMENT

At this time, due to the large volume of fuel-oil released catastrophically from the former UST, groundwater and indoor air of the church basement remain threatened by the residual soil contamination. The emergency installation of the SVE system is alleviating the threat to the groundwater and indoor air by applying a vacuum on the source area to prevent further downward migration of the free product, and recovering and treating petroleum vapors adjacent to the church basement.

4.1 Receptor Identification

The following sensitive receptors were identified in the vicinity of the subject property.

- Soils and groundwater within the general vicinity of the former USTs;
- Indoor air within the church basement and elevator shaft.

4.2 Risk Assessment

On the basis of the information obtained during this investigation, **R.E.A.** has qualitatively assessed the risks that the subsurface contamination poses to human health and the environment. The findings are summarized as follows:

- Subsurface soils in the immediate vicinity of the former UST have been impacted by the petroleum release. PID readings on soil samples collected for the MW-1 soil boring ranged between 0.0 and 387 ppmv, which exceeds the VT DEC action level of 10 ppmv for fuel-oil/diesel contaminated soils.
- Ground water immediately beneath the former UST has been impacted by petroleum contamination. Total petroleum hydrocarbons were detected at 0.55 mg/L in the sample collected from MW-1, which is located within the former UST excavation.
- PID readings within the basement and first floor of the church have ranged between 0.0 to 0.2 ppmv. On 1 March 2006, church personnel noted odors in the elevator when the elevator stayed on the basement floor overnight. PID readings detected in the elevator shaft during a follow-up inspection by **R.E.A.** on 13 March 2006 were 0.5 ppmv, but no petroleum odors were noted at that time.
- Drinking water for the subject property and adjacent properties is provided by the Town of St. Johnsbury Water System (WSID # 5045) and no private drinking water supply wells are known to be located within close proximity of the site.

5.0 DATA EVALUATION AND REGULATORY STATUS

It is estimated that between 900 to 1,400 gallons of fuel-oil were catastrophically released from a 1,000-gallon UST located at the Grace United Methodist Church. Due to the volume of fuel-oil released, the VT DEC requested that corrective action be completed immediately to prevent gross contamination of the underlying surficial aquifer. Generally, the VT DEC requires active remediation when greater than 1/8" of free-product is present, or when human health or a sensitive receptor is impacted or threatened by contamination. Available information indicates that groundwater beneath the site has been impacted by the release; however, no regulatory standards have been exceeded. Current information suggests that the former UST is the source of petroleum contamination discovered at the site. At this time, the extent of subsurface petroleum contamination has been adequately defined and no off-site receptors appear to be threatened or impacted.

A summary of the significant findings of the ISI is outlined below:

- Groundwater beneath the site has not been significantly impacted by the fuel-oil release at this time; however low concentrations of total petroleum hydrocarbons were detected in the sample collected from MW-1.
- Free product has not been detected in any of the onsite monitoring wells.
- No volatile petroleum compounds were detected in any of the samples collected from the four onsite monitoring wells.
- TPH was not detected in the samples collected from any of the other monitoring wells.
- PID readings on soil samples collected from the four on-site monitoring wells ranged between 0.0 and 387 ppmv, which are above the VT DEC action limit of 10 ppmv for fuel-oil/diesel contaminated soils. The highest PID readings were detected in soil samples collected from the MW-1 soil boring, which was installed within the excavation of the former UST.
- Subsurface soils at the site consisted primarily of fine to medium sand, with some silt lenses.
- Ground water in the shallow overburden formation appears to flow primarily toward the southeast, which is consistent with site topography and the location of surface water features.
- A soil vapor extraction (SVE) system was installed in and downgradient of the source area at the request of the VT DEC to prevent further downward migration of the fuel oil toward the groundwater and to alleviate possible threats to indoor air of the church basement. Influent PID readings have ranged between 0.0 and 191 ppmv.

6.0 RECOMMENDATIONS

On the basis of the results of this investigation and the conclusions stated above, **R.E.A.** makes the following recommendations:

1. The monitoring wells should be sampled to confirm the original results. Each monitoring well should be sampled for the possible presence of volatile petroleum compounds and total petroleum hydrocarbons in accordance with U.S. EPA Methods 8021b and 8015DRO (diesel-range organics), respectively. This sampling event should occur during May 2006.
2. Operation of the SVE system should be continued until influent PID readings are less than 10 ppmv.
3. The influent and effluent air flow of the SVE system should be monitored using a portable photo-ionization detector (PID) on a bi-weekly basis. The indoor air of the basement and elevator shaft of the church should also be screened with the PID during each inspection. Additionally, monitoring well MW-1 should be monitored for the possible presence of free product during these routine system inspections. A mass removal calculation table should be created for the Site, which would use influent PID concentrations, influent oxygen concentrations, and background oxygen concentrations to calculate the estimated total contaminant mass removed by the SVE system.
4. An influent air sample (pre treatment) should be collected from the SVE system, and analyzed for volatile petroleum compounds by EPA method 8021B to determine baseline concentrations of individual organic compounds in the extraction stream.
5. A summary report should be completed following the next groundwater sampling event, which should include recommendations for long-term monitoring.
6. The area of the UST excavation and trenching should be re-graded and paved as soon as weather permits

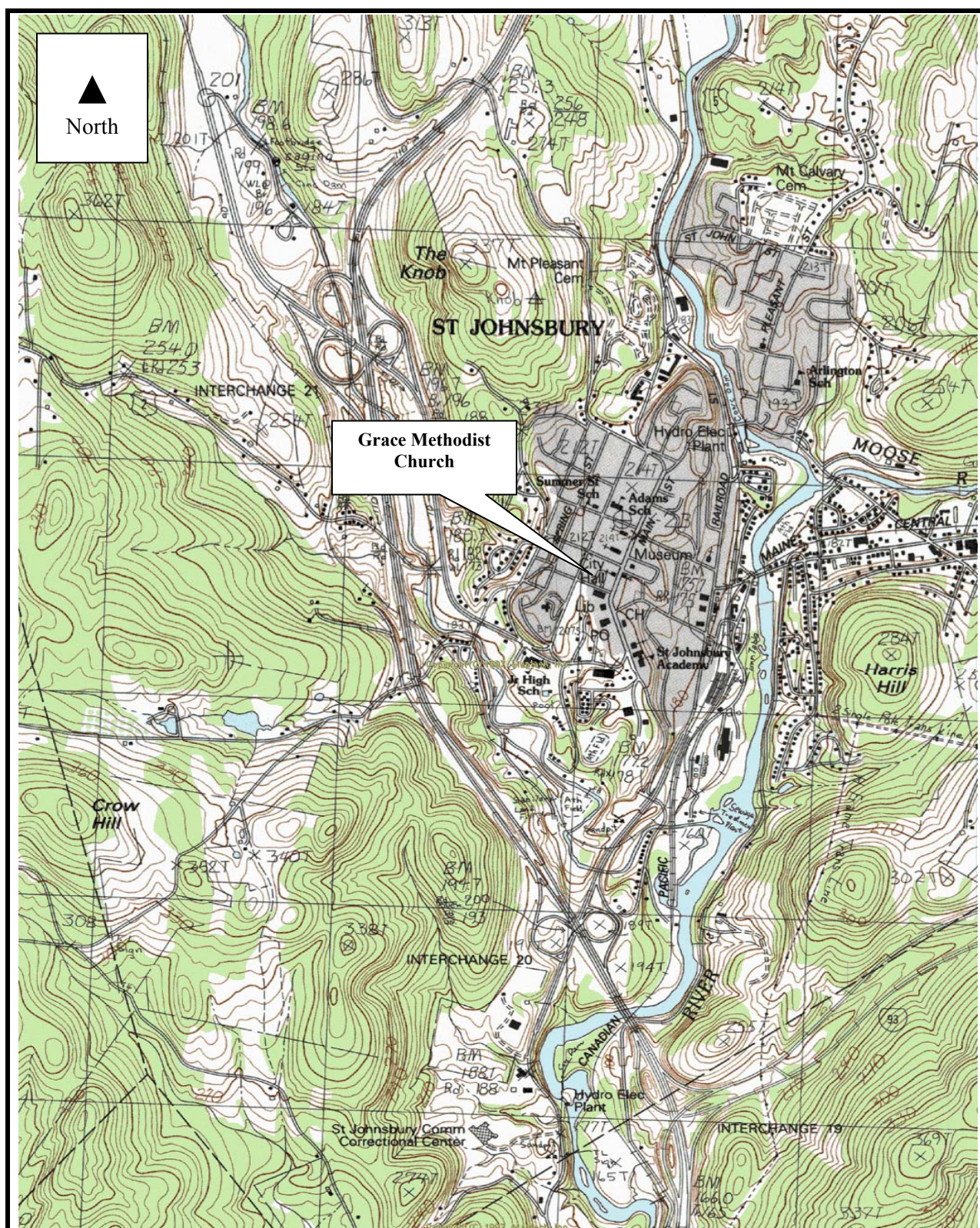
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FIGURES AND TABLES

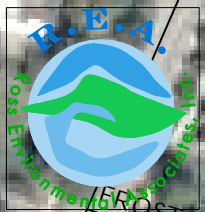


Approximate Scale: 1 inch = 1,400 feet

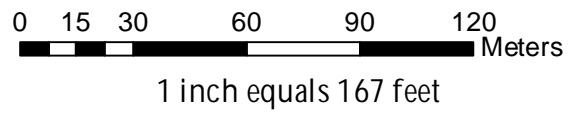
Site Coordinates: 44° 25' 10.43" N, 72° 01' 19.49" W

Source: USGS 1983. St. Johnsbury, VT.
 Provisional Edition 1983. (7.5 X 15 minute series)
 Topographic map. Maptech, Inc. 1998.
 R.E.A. Project No. 26-012

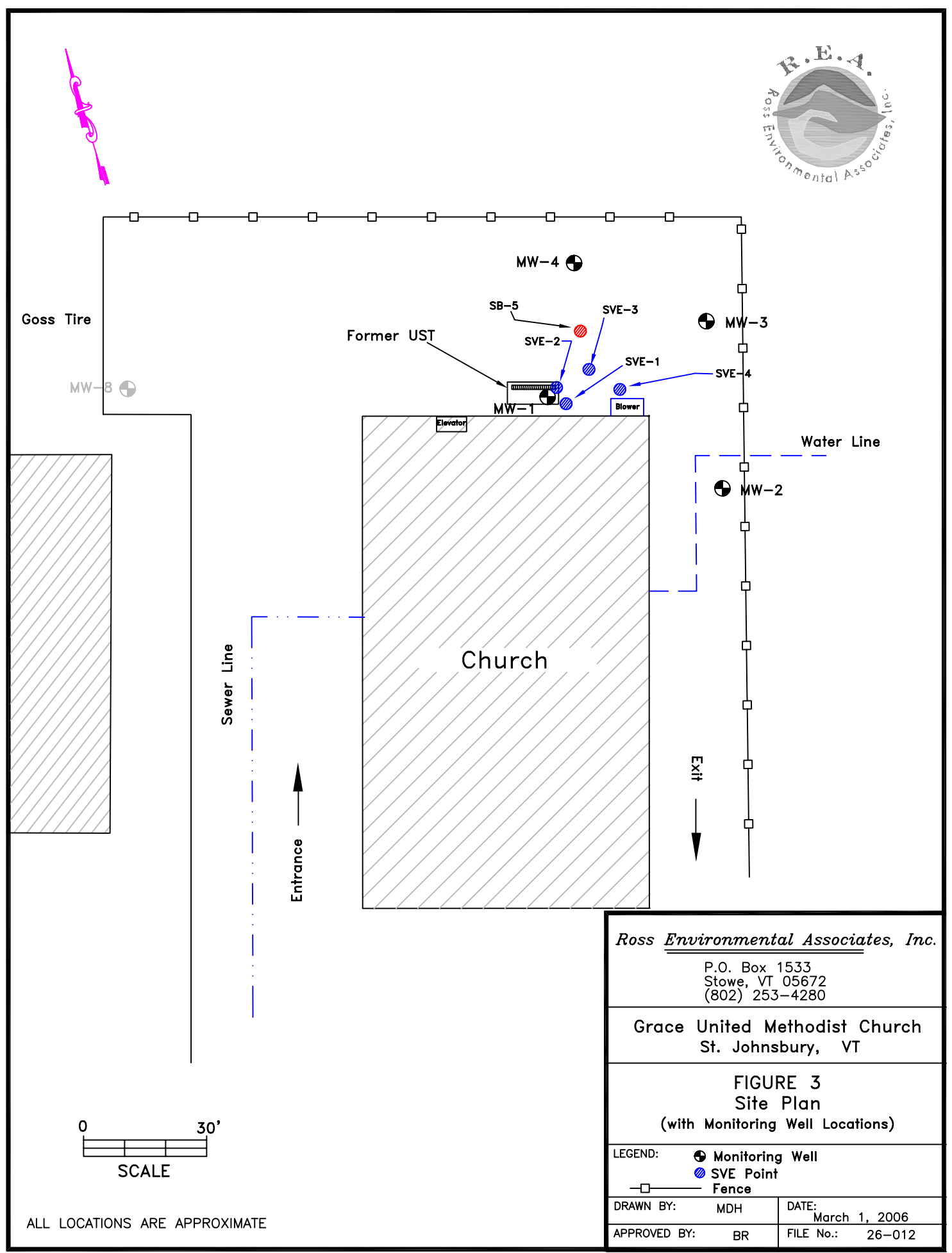
Figure 1
 Site Location Map
 Grace Methodist Church
 St. Johnsbury, Vermont



Grace Methodist Church
36 Central Street
St. Johnsbury, VT



Map Source:
Orthophoto USDA 2003.
Photo Date 2003.
E-911 Roads 2004



Ross Environmental Associates, Inc.

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Stowe, VT 05672
(802) 253-4280

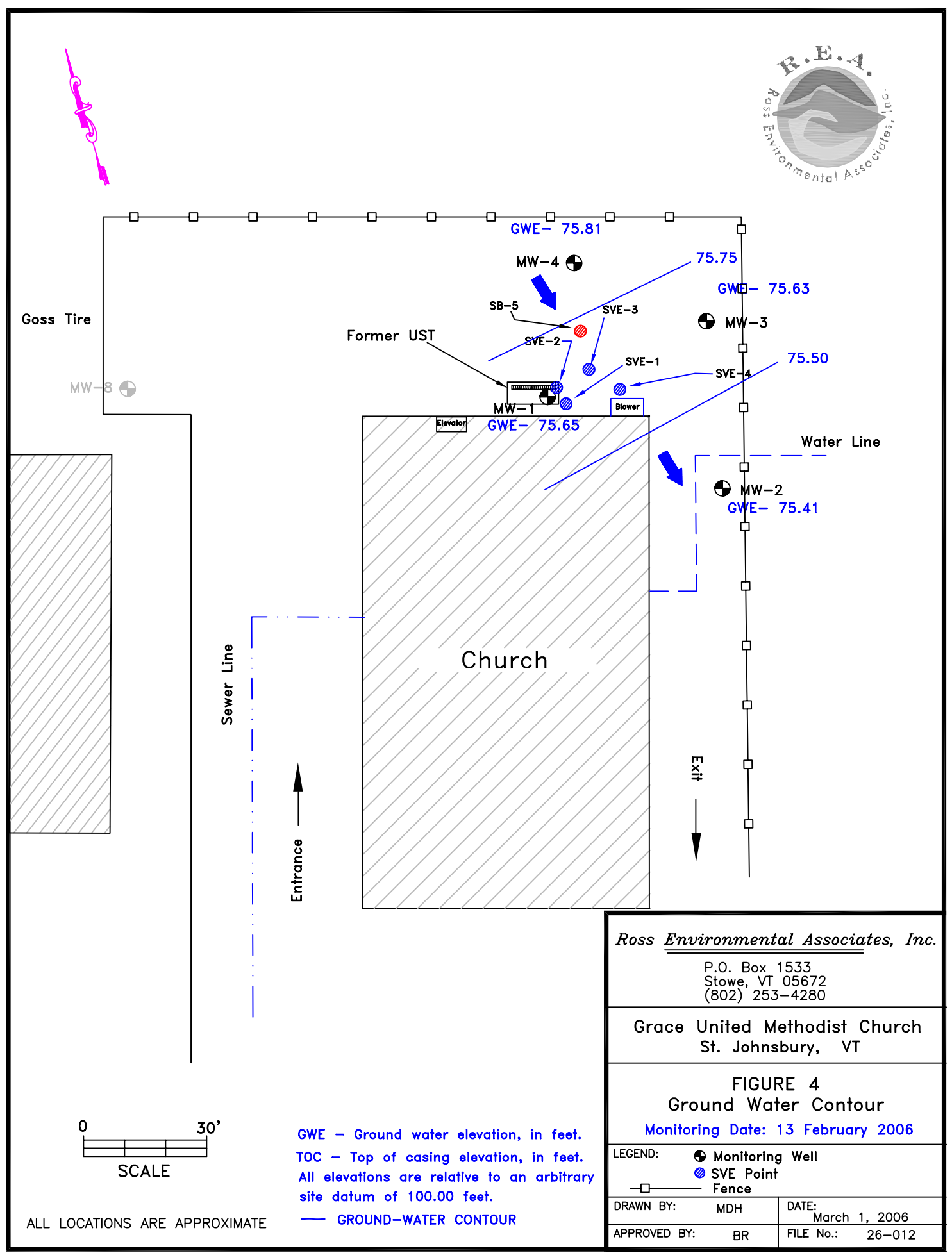
Grace United Methodist Church
St. Johnsbury, VT

FIGURE 3
Site Plan
(with Monitoring Well Locations)

LEGEND: Monitoring Well
 SVE Point
 Fence

DRAWN BY: MDH	DATE: March 1, 2006
APPROVED BY: BR	FILE No.: 26-012

ALL LOCATIONS ARE APPROXIMATE



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Grace United Methodist Church
St. Johnsbury, VT

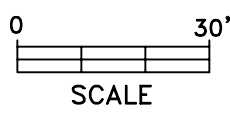
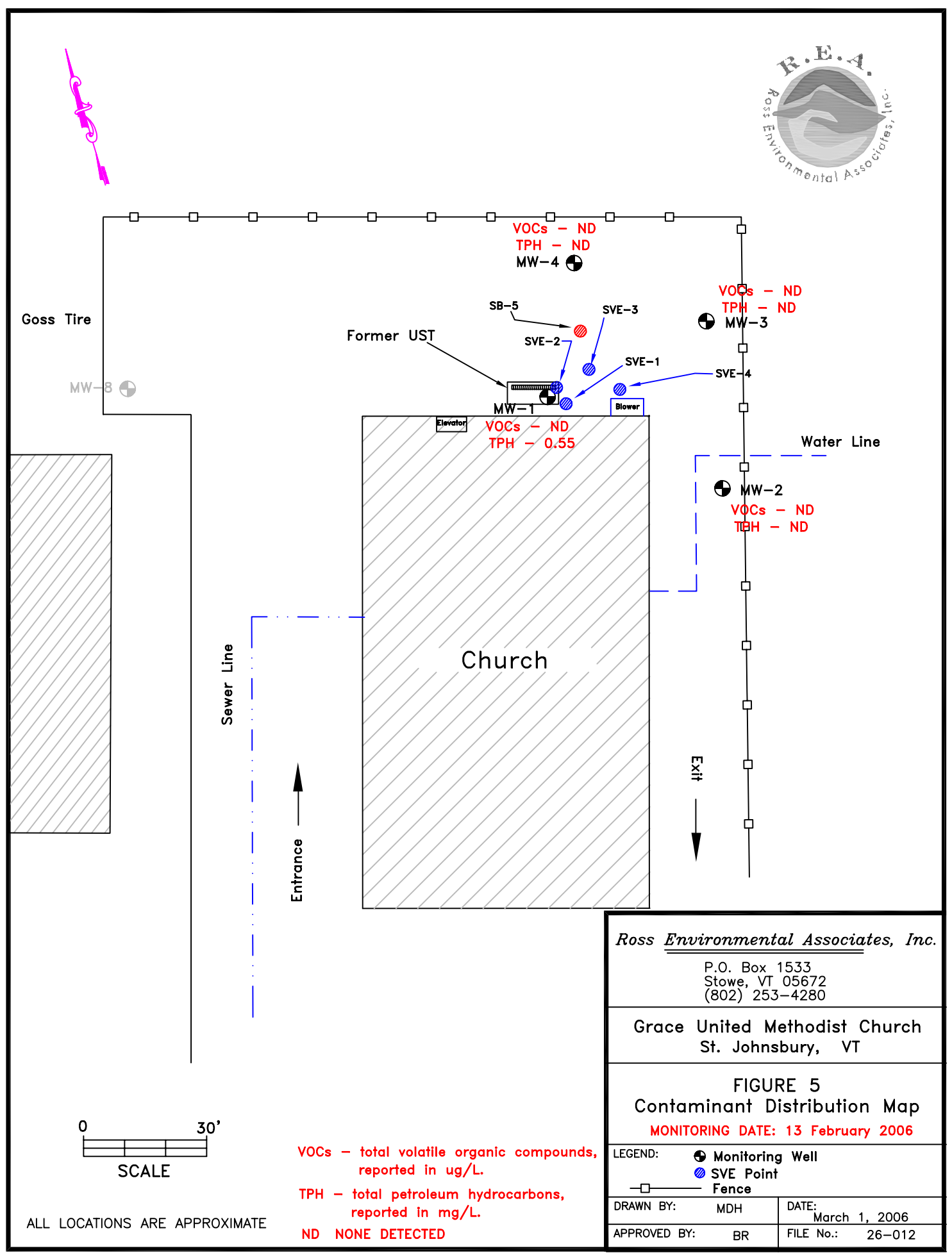
FIGURE 4
Ground Water Contour

Monitoring Date: 13 February 2006

LEGEND: Monitoring Well
SVE Point
Fence

DRAWN BY: MDH
APPROVED BY: BR

DATE: March 1, 2006
FILE No.: 26-012



VOCs - total volatile organic compounds, reported in ug/L.
TPH - total petroleum hydrocarbons, reported in mg/L.
ND NONE DETECTED

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Grace United Methodist Church
St. Johnsbury, VT

FIGURE 5
Contaminant Distribution Map
MONITORING DATE: 13 February 2006

LEGEND: Monitoring Well
 SVE Point
 Fence

DRAWN BY: MDH	DATE: March 1, 2006
APPROVED BY: BR	FILE No.: 26-012

ALL LOCATIONS ARE APPROXIMATE

TABLE 1
GROUND WATER ELEVATION CALCULATIONS

Grace United Methodist Church
St. Johnsbury, Vermont

Monitoring Date: 13 February 2006

Well I.D.	Top of Casing Elevation (ft)	Depth to Water (ft)	Water Table Elevation (ft)
MW-1	100.00	24.35	75.65
MW-2	99.84	24.43	75.41
MW-3	100.03	24.40	75.63
MW-4	100.07	24.26	75.81

All values reported in feet relative to arbitrary site datum of 100.00 feet

TABLE 2
GROUND-WATER ANALYTICAL RESULTS

Grace United Methodist Church
St. Johnsbury, Vermont

Monitoring Date: 13 February 2006

Sample ID	MTBE	Benzene	Toluene	Ethyl benzene	Total Xylenes	1,3,5 TMB	1,2,4 TMB	Naphthalene	Total VOCs	TPH (mg/L)	UIP
MW-1	ND<2.0	ND <1.0	ND <1.0	ND <1.0	ND <2.0	ND <1.0	ND <1.0	ND <1.0	ND	0.55	0
MW-2	ND<2.0	ND <1.0	ND <1.0	ND <1.0	ND <2.0	ND <1.0	ND <1.0	ND <1.0	ND	ND<0.4	0
MW-3	ND<2.0	ND <1.0	ND <1.0	ND <1.0	ND <2.0	ND <1.0	ND <1.0	ND <1.0	ND	ND<0.4	0
MW-4	ND<2.0	ND <1.0	ND <1.0	ND <1.0	ND <2.0	ND <1.0	ND <1.0	ND <1.0	ND	ND<0.4	0
VGES	40	5.0	1,000	700	10,000	4.0	5.0	20	--	--	--

QA/QC Samples

Duplicate MW-1	ND<2.0	ND <1.0	ND <1.0	ND <1.0	ND <2.0	ND <1.0	ND <1.0	ND <1.0	ND	0.55	0
MW-1	ND<2.0	ND <1.0	ND <1.0	ND <1.0	ND <2.0	ND <1.0	ND <1.0	ND <1.0	ND	0.67	0
% Difference	---	---	---	---	---	---	---	---	---	21.82	---
TB-1	ND <2.0	ND <1.0	ND <1.0	ND <1.0	ND <2.0	ND <1.0	ND <1.0	ND <1.0	ND	---	0

Notes: All results reported as micrograms per liter (ug/L). ND: None detected at indicated detection limit.
 UIP: Unidentified Peaks.
 Shaded values indicate exceedance of Vermont Groundwater Enforcement Standards (VGESs).
 1,3,5-TMB = 1,3,5-trimethylbenzene and 1,2,4-TMB = 1,2,4-trimethylbenzene.

TABLE 3
FIELD MEASUREMENT DATA

Grace United Methodist Church
St. Johnsbury, Vermont

Monitoring Date: 13 February 2006

Well ID	pH (su)	Specific conductivity (uS)	Temperature (°C)	TDS (ppm)	ORP (mV)	Collection Time	Comments
MW-1	6.81	813.4	8.1	548.8	114	11:30	No odors, Dup
MW-2	6.41	453.8	9.0	301.5	128	11:40	No odors
MW-3	8.90	626.7	8.9	419.1	24	11:50	No odors
MW-4	8.19	441.7	6.5	290.9	-33	12:20	

pH reported in standard units (s.u.). Specific conductivity reported in microsiemens (uS) .
Oxidation-reduction potential (ORP) reported in millivolts (mV).
Total dissolved solids (TDS) reported in parts per million (ppm).

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SITE PHOTOGRAPHS



GRACE METHODIST CHURCH – ST. JOHNSBURY, VERMONT
(Installation of MW-1 – View Toward East)



GRACE METHODIST CHURCH – ST. JOHNSBURY, VERMONT
(Installation of MW-2 – View Toward Northeast)



GRACE METHODIST CHURCH – ST. JOHNSBURY, VERMONT
(Installation of MW-3 – View Toward Northeast)



GRACE METHODIST CHURCH – ST. JOHNSBURY, VERMONT
(Installation of MW-4 – View Toward North)



GRACE METHODIST CHURCH – ST. JOHNSBURY, VERMONT
(Trenchwork and Subsurface SVE Piping)




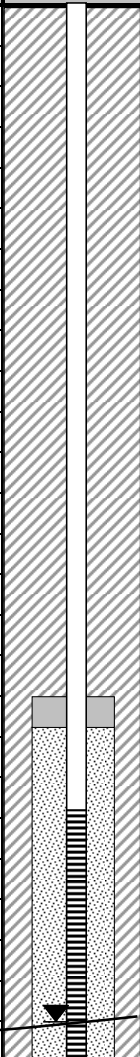







GRACE METHODIST CHURCH – ST. JOHNSBURY, VERMONT
(Above-ground SVE System Components – View Toward Southeast)


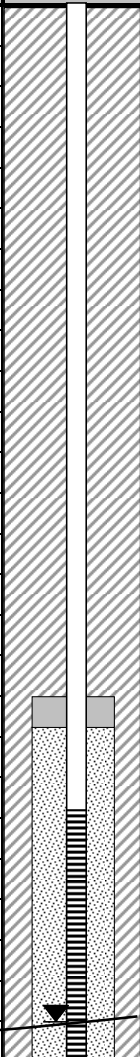
**SOIL BORING
MONITORING WELL LOGS**


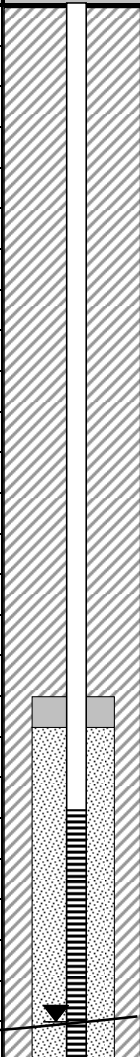







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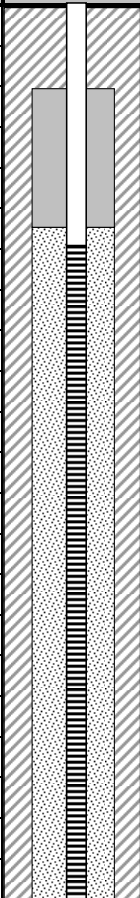

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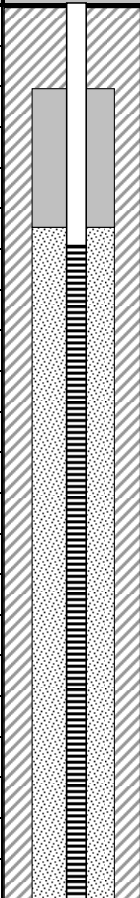

73 School Street P.O. Box 1533
Stowe, VT 05672


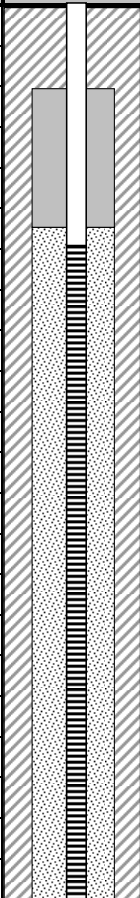

				BORING / WELL IDENTIFICATION: MW-2			
				Site Name:	Grace United Methodist Church		
				Site Location:	St. Johnsbury, VT		
Well Depth:	30'	Boring Depth:	28'	Installation Date:	2-Feb-06		
Depth to Water (during drilling):				25'	Job Number:	26-012	
Screen Diameter:	1 inch	Depth:	20-30'	REA Representative:	Juliette Hancock		
Screen Type/Size:	Schedule 40 PVC			Drilling Company:	Expedition Drilling		
Riser Diameter:	1 inch	Depth:	0-20'	Sampling Method:	Geoprobe		
Riser Type/Size:	Schedule 40 PVC			Reference Point (RP):			
Depth (ft)	Sample Depth (ft)	Blows/6" and Recovery (in)	Sample Description / Notes	PID (ppm)	Well Profile	Legend	
	0-4		Asphalt			 Concrete	
			Coarse SAND and Pebbles no odors.	0.0		 Native Material	
	4-8		Light brown coarse SAND	0.0		 Bentonite	
						 Filter Sand	
	8-12		Coarse SAND			 Riser	
			Dense SILT, no odors.	0.0		 Screen	
	12-16		SILT, no odors	0.0		 Water Level	
			Coarse SAND	0.0			
	16-20						
			Brown SILT				
			Medium SAND	0.0			
	20-24		Fine SAND, moist at 24', wet at 25'	0.0			
	24-28						
			Well set at 30' bgs	3.9			
PROPORTIONS USED		BLOW COUNT (COHESIVE SOILS)		BLOW COUNT (GRANULAR SOILS)		NOTES:	
AND 33-50%	LITTLE 10-20%	<2 VERY SOFT	8-15 STIFF	0-4 VERY LOOSE		30-50 DENSE	Photovac 2020 Used
SOME 20-33%	TRACE 0-10%	2-4 SOFT	15-30 VERY STIFF	4-10 LOOSE		>50 VERY DENSE	
		4-8 MEDIUM STIFF	>30 HARD	10-30 MEDIUM DENSE			










				BORING / WELL IDENTIFICATION: MW-3			
				Site Name: Grace United Methodist Church			
				Site Location: St. Johnsbury, VT			
Well Depth: 30'		Boring Depth: 28'		Installation Date: 2-Feb-06			
Depth to Water (during drilling): 25'				Job Number: 26-012			
Screen Diameter: 1 inch		Depth: 20-30'		REA Representative: Juliette Hancock			
Screen Type/Size: Schedule 40 PVC				Drilling Company: Expedition Drilling			
Riser Diameter: 1 inch		Depth: 0-20'		Sampling Method: Geoprobe			
Riser Type/Size: Schedule 40 PVC				Reference Point (RP):			
Depth (ft)	Sample Depth (ft)	Blows/6" and Recovery (in)	Sample Description / Notes	PID (ppm)	Well Profile	Legend	
	0-4		Asphalt			Concrete	
			Brown coarse SAND and SILT			Native Material	
				0.0			
	4-8		Brown coarse SAND			Bentonite	
						Filter Sand	
				0.0			
	8-12		Very coarse SAND			Riser	
						Screen	
			Dense brown SILT	0.0			
	12-16		Very coarse SAND, no odors			Water Level	
				0.0			
	16-20		Fine SAND				
			Brown SILT	0.0			
	20-24		Fine SAND no odors, wet at bottom				
				0.0			
	24-28						
			Well set at 30' bgs	0.0			
PROPORTIONS USED			BLOW COUNT (COHESIVE SOILS)			BLOW COUNT (GRANULAR SOILS)	
AND 33-50%	LITTLE 10-20%	<2 VERY SOFT	8-15 STIFF	0-4 VERY LOOSE		30-50 DENSE	NOTES: Photovac 2020 Used
SOME 20-33%	TRACE 0-10%	2-4 SOFT	15-30 VERY STIFF	4-10 LOOSE		>50 VERY DENSE	
		4-8 MEDIUM STIFF	>30 HARD	10-30 MEDIUM DENSE			

				BORING / WELL IDENTIFICATION: MW-4			
				Site Name: Grace United Methodist Church			
				Site Location: St. Johnsbury, VT			
Well Depth: 30'		Boring Depth: 28'		Installation Date: 2-Feb-06			
Depth to Water (during drilling): 25'				Job Number: 26-012			
Screen Diameter: 1 inch		Depth: 20-30'		REA Representative: Juliette Hancock			
Screen Type/Size: Schedule 40 PVC				Drilling Company: Expedition Drilling			
Riser Diameter: 1 inch		Depth: 0-20'		Sampling Method: Geoprobe			
Riser Type/Size: Schedule 40 PVC				Reference Point (RP):			
Depth (ft)	Sample Depth (ft)	Blows/6" and Recovery (in)	Sample Description / Notes	PID (ppm)	Well Profile	Legend	
	0-4		Asphalt and Gravel fill			 Concrete	
						 Native Material	
			Fine brown SAND, no odors	13.4			 Bentonite
	4-8		Coarse brown SAND, no odors.				 Filter Sand
				0.0			 Riser
	8-12						 Screen
			Dense brown SILT	1.6			 Water Level
	12-16						
			Fine SAND, no odors	0.0			
	16-20		Very fine SAND				
			Dense SILT, no odors	0.0			
	20-24		Same as above, moist				
			Coarse brown SAND, dry, no odors	0.0			
	24-28		Very fine SAND, wet at 24'				
			Well set at 30' bgs	0.0			
PROPORTIONS USED			BLOW COUNT (COHESIVE SOILS)	BLOW COUNT (GRANULAR SOILS)		NOTES:	
AND 33-50%	LITTLE 10-20%	<2 VERY SOFT	8-15 STIFF	0-4 VERY LOOSE		30-50 DENSE	Photovac 2020 Used
SOME 20-33%	TRACE 0-10%	2-4 SOFT	15-30 VERY STIFF	4-10 LOOSE		>50 VERY DENSE	
		4-8 MEDIUM STIFF	>30 HARD	10-30 MEDIUM DENSE			

				BORING / WELL IDENTIFICATION: SVE-1		
				Site Name: Grace United Methodist Church		
				Site Location: St. Johnsbury, VT		
Well Depth: 22'		Boring Depth: 22'		Installation Date: 8-Feb-06		
Depth to Water (during drilling): --				Job Number: 26-012		
Screen Diameter: 2 inch		Depth: 7-22'		REA Representative: Juliette Hancock		
Screen Type/Size: Schedule 40 PVC				Drilling Company: Technical Drilling Services		
Riser Diameter: 2 inch		Depth: 0-7'		Sampling Method: Geoprobe		
Riser Type/Size: Schedule 40 PVC				Reference Point (RP):		
Depth (ft)	Sample Depth (ft)	Blows/6" and Recovery (in)	Sample Description / Notes	PID (ppm)	Well Profile	Legend
0	0-4		No samples recovered			 Concrete
1						
2						
3						
4	4-8					
5						
6						
7						
8	8-12					
9						
10						
11						
12	12-16					
13						
14						
15						
16	16-20					
17						
18						
19						
20	20-24					
21						
22			SVE point set at 22' bgs			
23						
24	24-28					
25						
28						
PROPORTIONS USED		BLOW COUNT (COHESIVE SOILS)		BLOW COUNT (GRANULAR SOILS)		NOTES:
AND 33-50%	LITTLE 10-20%	<2 VERY SOFT	8-15 STIFF	0-4 VERY LOOSE	30-50 DENSE	Photovac 2020 Used
SOME 20-33%	TRACE 0-10%	2-4 SOFT	15-30 VERY STIFF	4-10 LOOSE	>50 VERY DENSE	
		4-8 MEDIUM STIFF	>30 HARD	10-30 MEDIUM DENSE		

				BORING / WELL IDENTIFICATION: SVE-3		
				Site Name: Grace United Methodist Church		
				Site Location: St. Johnsbury, VT		
Well Depth:	22'	Boring Depth:	22'	Installation Date:	8-Feb-06	
Depth to Water (during drilling): --				Job Number:	26-012	
Screen Diameter:	2 inch	Depth:	7-22'	REA Representative:	Juliette Hancock	
Screen Type/Size:	Schedule 40 PVC			Drilling Company:	Technical Drilling Services	
Riser Diameter:	2 inch	Depth:	0-7'	Sampling Method:	Geoprobe	
Riser Type/Size:	Schedule 40 PVC			Reference Point (RP):		
Depth (ft)	Sample Depth (ft)	Blows/6" and Recovery (in)	Sample Description / Notes	PID (ppm)	Well Profile	Legend
0	0-4		No samples recovered			 Concrete
1						
2						
3						
4	4-8					
5						
6						
7						
8	8-12					
9						
10						
11						
12	12-16					
13						
14						
15						
16	16-20					
17						
18						
19						
20	20-24					
21						
22			SVE point set at 22' bgs			
23						
24	24-28					
25						
28						
PROPORTIONS USED		BLOW COUNT (COHESIVE SOILS)		BLOW COUNT (GRANULAR SOILS)		NOTES:
AND 33-50%	LITTLE 10-20%	<2 VERY SOFT	8-15 STIFF	0-4 VERY LOOSE	30-50 DENSE	Photovac 2020 Used
SOME 20-33%	TRACE 0-10%	2-4 SOFT	15-30 VERY STIFF	4-10 LOOSE	>50 VERY DENSE	
		4-8 MEDIUM STIFF	>30 HARD	10-30 MEDIUM DENSE		

				BORING / WELL IDENTIFICATION: SVE-4		
				Site Name: Grace United Methodist Church		
				Site Location: St. Johnsbury, VT		
Well Depth: 22'		Boring Depth: 22'		Installation Date: 8-Feb-06		
Depth to Water (during drilling): --				Job Number: 26-012		
Screen Diameter: 2 inch		Depth: 7-22'		REA Representative: Juliette Hancock		
Screen Type/Size: Schedule 40 PVC				Drilling Company: Technical Drilling Services		
Riser Diameter: 2 inch		Depth: 0-7'		Sampling Method: Geoprobe		
Riser Type/Size: Schedule 40 PVC				Reference Point (RP):		
Depth (ft)	Sample Depth (ft)	Blows/6" and Recovery (in)	Sample Description / Notes	PID (ppm)	Well Profile	Legend
0	0-4		No samples recovered			 Concrete
1						
2						
3						
4	4-8					
5						
6						
7						
8	8-12					
9						
10						
11						
12	12-16					
13						
14						
15						
16	16-20					
17						
18						
19						
20	20-24					
21						
22			SVE point set at 22' bgs			
23						
24	24-28					
25						
28						
PROPORTIONS USED		BLOW COUNT (COHESIVE SOILS)		BLOW COUNT (GRANULAR SOILS)		NOTES:
AND 33-50%	LITTLE 10-20%	<2 VERY SOFT	8-15 STIFF	0-4 VERY LOOSE	30-50 DENSE	Photovac 2020 Used
SOME 20-33%	TRACE 0-10%	2-4 SOFT	15-30 VERY STIFF	4-10 LOOSE	>50 VERY DENSE	
		4-8 MEDIUM STIFF	>30 HARD	10-30 MEDIUM DENSE		

				BORING / WELL IDENTIFICATION: SB-5		
				Site Name: Grace United Methodist Church		
				Site Location: St. Johnsbury, VT		
Well Depth: N/A		Boring Depth: 25'		Installation Date: 2-Feb-06		
Depth to Water (during drilling): 25'				Job Number: 26-012		
Screen Diameter:		Depth:		REA Representative: Juliette Hancock		
Screen Type/Size:				Drilling Company: Expedition Drilling		
Riser Diameter:		Depth:		Sampling Method: Geoprobe		
Riser Type/Size:				Reference Point (RP):		
Depth (ft)	Sample Depth (ft)	Blows/6" and Recovery (in)	Sample Description / Notes	PID (ppm)	Well Profile	Legend
0	0-5		Asphalt and Gravel fill			 Concrete
1			Fine brown SAND, no odors			 Native Material
2						
3						
4				0.0		 Bentonite
5	5-10					 Filter Sand
6						
7						
8						 Riser
9				0.0		
10	10-15					 Screen
11			Brown SILT			
12						 Water Level
13			Fine brown SAND, no odors			
14				0.0		
15	15-20		Very fine brown SAND			
16						
17						
18						
19				0.0		
20	20-25		Brown SILT			
21						
22						
23			Coarse SAND, no odors, wet at 25'			
24						
25				0.0		
PROPORTIONS USED		BLOW COUNT (COHESIVE SOILS)		BLOW COUNT (GRANULAR SOILS)		NOTES:
AND 33-50%	LITTLE 10-20%	<2 VERY SOFT	8-15 STIFF	0-4 VERY LOOSE	30-50 DENSE	Photovac 2020 Used
SOME 20-33%	TRACE 0-10%	2-4 SOFT	15-30 VERY STIFF	4-10 LOOSE	>50 VERY DENSE	
		4-8 MEDIUM STIFF	>30 HARD	10-30 MEDIUM DENSE		

**LABORATORY
ANALYTICAL REPORTS**

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LABORATORY REPORT

Laboratory Services

160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

Ross Environ. Assoc., Inc.
PO Box 1533, 96 Taber Hill Rd
Stowe, VT 05672
Attn: Juliette Hancock

PROJECT: Grace United Methodist Church 26
ORDER ID: 43113
RECEIVE DATE: February 15, 2006
REPORT DATE: March 1, 2006

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

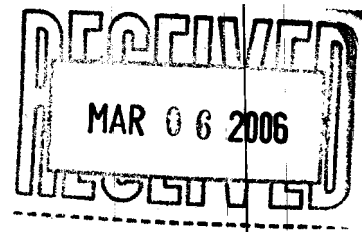
Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which include matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits, unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures





ENDYNE, INC.

Laboratory Services

160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

CLIENT: Ross Environ. Assoc., Inc.

ORDER ID: 43113

PROJECT: Grace United Methodist Church 26-012

DATE RECEIVED: February 15, 2006

REPORT DATE: March 1, 2006

SAMPLER: JS

Site: MW-1 Ref. Number: 268855 Anal. Method: SW 8021B Date Sampled: 2/13/06 Time Sampled: 11:30 AM Analysis Date: 2/21/06 Analyst: 101		Site: MW-3 Ref. Number: 268857 Anal. Method: SW 8021B Date Sampled: 2/13/06 Time Sampled: 11:50 AM Analysis Date: 2/21/06 Analyst: 101		Site: Dup Ref. Number: 268859 Anal. Method: SW 8021B Date Sampled: 2/13/06 Time Sampled: NI Analysis Date: 2/21/06 Analyst: 101	
Parameter	Results ug/L	Parameter	Results ug/L	Parameter	Results ug/L
MTBE	< 2.0	MTBE	< 2.0	MTBE	< 2.0
Benzene	< 1.0	Benzene	< 1.0	Benzene	< 1.0
Toluene	< 1.0	Toluene	< 1.0	Toluene	< 1.0
Ethylbenzene	< 1.0	Ethylbenzene	< 1.0	Ethylbenzene	< 1.0
Xylenes, Total	< 2.0	Xylenes, Total	< 2.0	Xylenes, Total	< 2.0
1,3,5 Trimethyl Benzene	< 1.0	1,3,5 Trimethyl Benzene	< 1.0	1,3,5 Trimethyl Benzene	< 1.0
1,2,4 Trimethyl Benzene	< 1.0	1,2,4 Trimethyl Benzene	< 1.0	1,2,4 Trimethyl Benzene	< 1.0
Naphthalene	< 1.0	Naphthalene	< 1.0	Naphthalene	< 1.0
UIP's	0.	UIP's	0.	UIP's	0.
Surrogate 1	98.0%	Surrogate 1	96.0%	Surrogate 1	94.0%
Site: MW-2 Ref. Number: 268856 Anal. Method: SW 8021B Date Sampled: 2/13/06 Time Sampled: 11:40 AM Analysis Date: 2/21/06 Analyst: 101		Site: MW-4 Ref. Number: 268858 Anal. Method: SW 8021B Date Sampled: 2/13/06 Time Sampled: 12:20 PM Analysis Date: 2/21/06 Analyst: 101		Site: TB Ref. Number: 268860 Anal. Method: SW 8021B Date Sampled: 2/13/06 Time Sampled: 1:25 PM Analysis Date: 2/23/06 Analyst: 101	
Parameter	Results ug/L	Parameter	Results ug/L	Parameter	Results ug/L
MTBE	< 2.0	MTBE	< 2.0	MTBE	< 2.0
Benzene	< 1.0	Benzene	< 1.0	Benzene	< 1.0
Toluene	< 1.0	Toluene	< 1.0	Toluene	< 1.0
Ethylbenzene	< 1.0	Ethylbenzene	< 1.0	Ethylbenzene	< 1.0
Xylenes, Total	< 2.0	Xylenes, Total	< 2.0	Xylenes, Total	< 2.0
1,3,5 Trimethyl Benzene	< 1.0	1,3,5 Trimethyl Benzene	< 1.0	1,3,5 Trimethyl Benzene	< 1.0
1,2,4 Trimethyl Benzene	< 1.0	1,2,4 Trimethyl Benzene	< 1.0	1,2,4 Trimethyl Benzene	< 1.0
Naphthalene	< 1.0	Naphthalene	< 1.0	Naphthalene	< 1.0
UIP's	0.	UIP's	0.	UIP's	0.
Surrogate 1	98.0%	Surrogate 1	94.0%	Surrogate 1	97.0%



ENDYNE, INC.

160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

CHAIN-OF-CUSTODY-RECORD

77456

Special Reporting Instructions:

Project Name: Grace United Methodist Church 26-012		Reporting Address: REA		Billing Address: REA	
Endyne Order ID: 43113	2-0 -I -S	Company: REA Contact Name/Phone #: Juliette Hancock (802) 253-4280		Sampler Name: J.B. Phone #: (same)	

Ref # (Lab Use Only)	Sample Identification	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
	mw-1	H ₂ O	X		2/13/06 11:30	4	40mL		19,23	HCl	
	mw-2				11:40						
	mw-3				11:50						
	mw-4				12:20						
	Dup TB				13:25	2			19		
	/	/	/	/	/	/	/	/	/	/	/
	/	/	/	/	/	/	/	/	/	/	/
	/	/	/	/	/	/	/	/	/	/	/
	/	/	/	/	/	/	/	/	/	/	/
	/	/	/	/	/	/	/	/	/	/	/
	/	/	/	/	/	/	/	/	/	/	/

Relinquished by: James J. Gorcey	Date/Time: 2/14/2006 8:28	Received by: [Signature]	Date/Time: 11:55 AM 2-15-06	Received by: S. Brubaker	Date/Time: 2/15/06 13:50
----------------------------------	---------------------------	--------------------------	-----------------------------	--------------------------	--------------------------

New York State Project: Yes ☐ No ☒ Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	RCRA8 Metals
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	24	8260/8260B	29	
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30	
31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Ti, V, Zn										
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)						33				
34	Other										

Delivery: Client

Temp: 6.90

Comment:

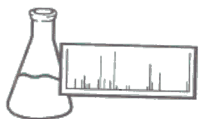
LAB USE ONLY

Delivery: Client

Temp: 6.90

Comment:

(White, Yellow - Laboratory / Pink - Client)



ENDYNE, INC.

LABORATORY REPORT

Laboratory Services

160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

Ross Environ. Assoc., Inc.
PO Box 1533, 96 Taber Hill Rd
Stowe, VT 05672
Attn: Juliette Hancock

PROJECT: Grace United Methodist Church 26
ORDER ID: 43113
RECEIVE DATE: February 15, 2006
REPORT DATE: March 1, 2006

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

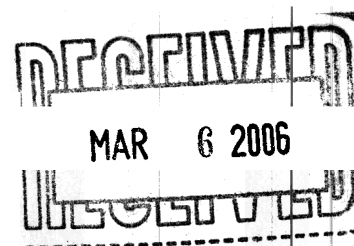
Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which include matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits, unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures





ENDYNE, INC

Laboratory Services

160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

CLIENT: Ross Environ. Assoc., Inc.

ORDER ID: 43113

PROJECT: Grace United Methodist Church 26-012

DATE RECEIVED: February 15, 2006

REPORT DATE: March 1, 2006

SAMPLER: JS

ANALYST: 207

Ref. Number: 268855

Site: MW-1

Date Sampled: February 13, 2006 Time: 11:30 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	0.55	mg/L	SW 8015B	2/25/06

Ref. Number: 268856

Site: MW-2

Date Sampled: February 13, 2006 Time: 11:40 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	< 0.40	mg/L	SW 8015B	2/25/06

Ref. Number: 268857

Site: MW-3

Date Sampled: February 13, 2006 Time: 11:50 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	< 0.40	mg/L	SW 8015B	2/25/06

Ref. Number: 268858

Site: MW-4

Date Sampled: February 13, 2006 Time: 12:20 PM

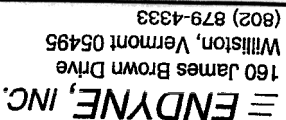
<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	< 0.40	mg/L	SW 8015B	2/25/06

Ref. Number: 268859

Site: Dup

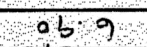
Date Sampled: February 13, 2006 Time: NI

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	0.67	mg/L	SW 8015B	2/25/06



Special Reporting Instructions:

Ref # (Lab Use Only)	Sample Identification	Matrix	G R A D E M O P	Date/Time 2/13/06	No. Type/Size	Sample Containers	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
	m.w.-1	H ₂ O	X	11:30	4	40mL		19, 23	HIC1	
	m.w.-2			11:40						
	m.w.-3			11:50						
	m.w.-H			12:20						
	Dwp			—						
	TB			13:25	2					

New York State Project: Yes													No													Requested Analyses												
1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH	Temp:	Delivery:	LAB USE ONLY																								
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals	Comment: <div>  </div>																										
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	RCRA8 Metals																											
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	24	8260/8260B	29																												
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30																												
31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Ti, V, Zn																																					
32	TCRP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)												33																									
34	Other																																					

SVE SYSTEM OPERATIONAL DATA

A P P E N D I X E

TABLE 4
VAPOR-PHASE VOC TREATMENT EFFICIENCY
(Granular Activated Carbon)

Grace United Methodist Church
St. Johnsbury, Vermont
25 January to 16 March 2006

Date	C-1 Influent PID Concentration (ppmv)	C-2 Effluent PID Concentration (ppmv)	Treatment Efficiency (%)
1/25/2006 14:00	191	2.0	99.0
1/25/2006 15:00	187	1.4	99.3
1/31/2006 11:15	26.4	0.0	100.0
1/31/2006 15:15	10.3	0.0	100.0
2/2/2006 9:30	65.0	0.0	100.0
2/3/2006 8:30	47.3	0.0	100.0
2/8/2006 9:00	38.4	24.6	35.9
2/10/2006 12:30	59.4	0.0	100.0
2/13/2006 12:00	38.5	0.0	100.0
2/17/2006 15:15	37.4	0.3	99.2
2/22/2006 9:30	35.0	0.1	99.7
3/1/2006 12:00	0.0	0.0	100.0
3/6/2006 13:00	31.2	0.0	100.0
3/13/2006 12:00	26.3	3.8	85.6
3/16/2006 10:00	20.7	0.8	96.1

Notes:

- C-1 = Carbon Unit #1
- C-2 = Carbon Unit #2
- ppmv = parts per million volume
- PID = Photionization Detector
- VOC = Volatile Organic Compound
- VOC concentrations measured with a Photoionization Detector, calibrated to a benzene reference.

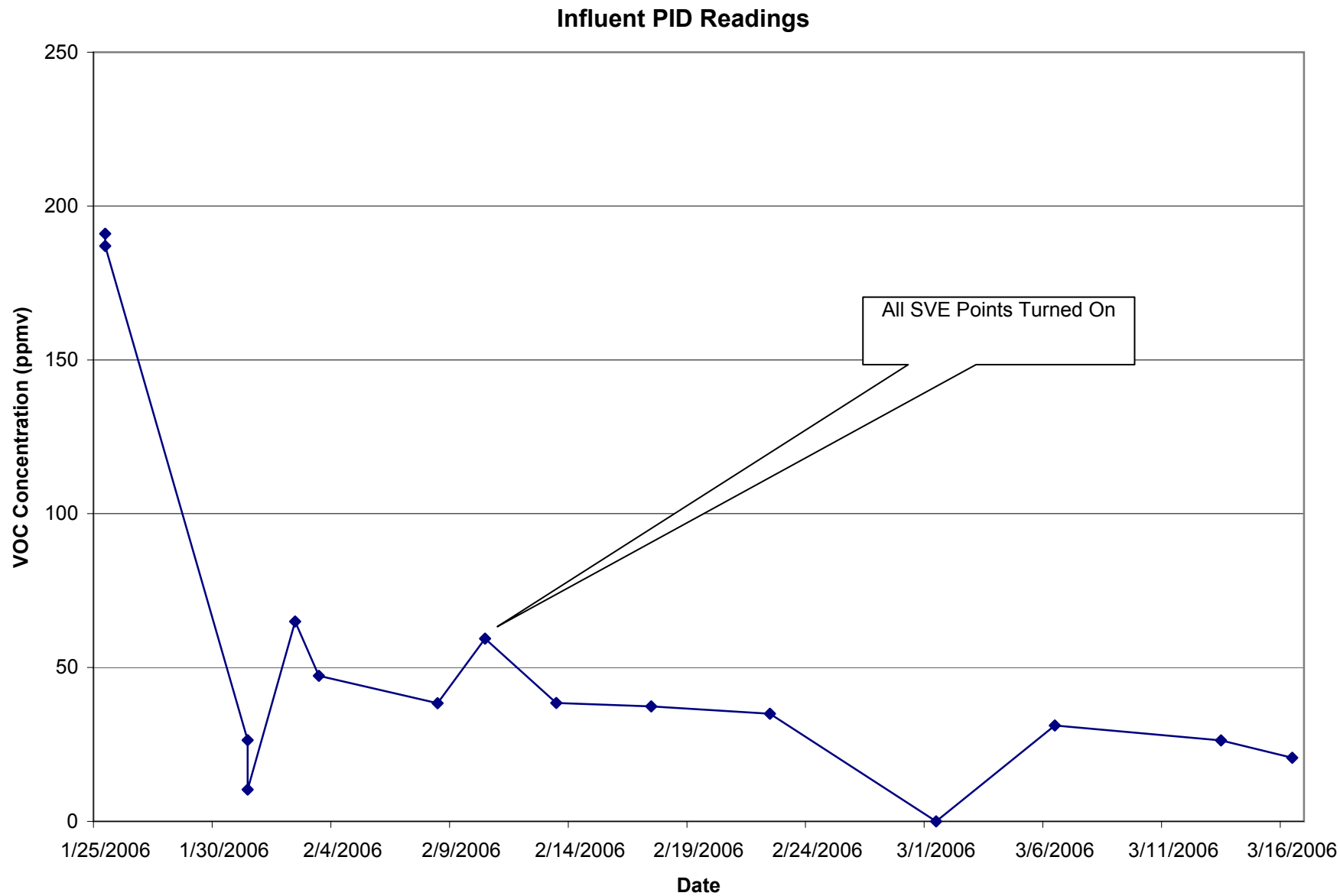


Figure 5
SVE Influent PID Readings
Grace United Methodist Church
St. Johnsbury, Vermont